

California Environmental Protection Agency



Air Resources Board

PROPOSED MODIFICATIONS TO

Vapor Recovery Test Procedure

TP - 201.2D

Post-Fueling Drips From Nozzles ~~Spouts~~

Adopted: February 1, 2001

Amended:

Note: Proposed 15-day changes are shown with double underline for addition and ~~double strikeout~~ for deletion. [Bracketed text] is not part of the proposed amendments.

California Environmental Protection Agency Air Resources Board

Vapor Recovery Test Procedure

TP-201.2D

Post-Fueling Drips from Nozzles ~~Spouts~~

A set of definitions common to all Certification and Test Procedures is in:

D-200 Definitions for Vapor Recovery Procedures

For the purpose of this procedure, the term "CARB" refers to the California Air Resources Board; the term "Executive Officer" refers to the CARB Executive Officer, or his or her authorized representative or designate; and the term "CP-201" refers to CARB CP-201 Certification Procedure for Vapor Recovery Systems at Gasoline Dispensing Facilities.

1. PURPOSE AND APPLICABILITY

- 1.1 The purpose of this procedure is to quantify ~~liquid~~ gasoline drips from nozzles following refueling events. It is applicable, during the certification process, for determining compliance with the performance standard for the maximum allowable number of ~~liquid~~ gasoline drips as defined in CP-201, the Certification (CP-201).
- 1.2 The term "drip" is used for consistency throughout this test procedure. However, other CARB documents may use the terms "drip" and "drop" interchangeably.

2. PRINCIPLE AND SUMMARY OF TEST PROCEDURE

~~2.1 The vapor recovery nozzles and associated hanging hardware are inspected and verified to be in good working order, as specified in CCR, title 17, section 94006, including the requirement that the nozzle's primary shutoff mechanism is in good working order.~~

~~2.2~~

2.1 The vapor recovery nozzle is used to dispense gasoline into a vehicle fuel tank. Upon activation of the nozzle's primary shutoff mechanism, ten (10) seconds are allowed to elapse prior to removal of the nozzle from the vehicle fillpipe. The nozzle is then ~~inverted~~ removed and the number of drips of ~~liquid~~ gasoline are quantified, ~~for a period of five (5) seconds.~~

~~2.3~~

2.2 Compliance with the performance standard specified in CP-201 shall be determined using the ~~combined average result of the ten all~~ test runs for each from all the nozzles tested. A minimum of ten nozzles shall be tested for certification.

3. BIASES AND INTERFERENCES

3.1 Nozzle orientation during ~~refueling~~ dispensing can affect the response time of the primary shutoff mechanism. To eliminate this bias, the nozzle shall be inserted into each vehicle fillpipe in the same orientation, as specified in Section 7.

~~**3.2** Nozzles or associated components that have defects pursuant to title 17, CCR, section 94006 may bias the test toward non-compliance. Do not conduct this test during the certification process if the nozzle, or any associated component contains a defect.~~

~~**3.3**~~

3.2 Spitback may bias the results of the test procedure toward noncompliance. During the certification process, spitback occurrences shall be noted on the Field Data Sheet (Form 1). ~~Results~~ If spitback is attributable to vehicle fillpipes that do not meet the requirements of title 13, CCR, section 2235, the data for that run shall not be ~~included~~ used in the calculations.

3.3 Based on graduations of the specified cylinder, gasoline that exits the nozzle as a trickle, and measures less than 0.3 milliliters (0.3 ml) will be reported as 2.5 drips. This technique will bias the results toward compliance.

3.4 Based on variations in gasoline product grade and fuel composition, the conversion of one milliliter (1 ml) as equal to 20 drips may underestimate the actual number of drips and the conversion may bias the result toward compliance.

4. SENSITIVITY, RANGE, AND PRECISION

4.1 The procedure is capable of determining spills as small as one ~~drop~~ drip per ~~refueling~~ event.

4.2 The sensitivity of the procedure is ~~one drip/refueling event, and~~ In addition, the precision ~~is~~ ranges from one ~~four drip/refueling event to 0.3 milliliter (0.3 ml) per fueling event, for less than ten milliliters (10 ml).~~

4.3 For the purpose of the test procedure, a ~~refueling~~ event shall consist of any vehicle ~~refueling~~ event of at least 4.5 gallons, terminated by activation of the nozzle's primary shutoff mechanism.

5. EQUIPMENT

5.1 Field Data Sheet. Use a Field Data Sheet, such as Form 1, to record testing information. ~~the number of drips from each acceptable refueling event, as defined in Section 4.3.~~

5.2 Nozzle Data Sheet. Use a Nozzle Data Sheet, such as Form 2, to record nozzle information.

~~**5.2**~~ **5.3** ~~Stopwatch.~~ Timing device. Use a timing device ~~stopwatch, equipped with a split timing function,~~ accurate to within 0.2 seconds, capable of indicating time in increments of one (1) second, ~~to determine the dispensing rate. The split function shall be used to determine~~

~~the 10 second specification in Section 7.6 of the procedure. Two stopwatches may be used instead of using a split timing function.~~

5.4 Graduated cylinder. Gasoline resistant, non-breakable graduated cylinder. Use a ten milliliter (10 ml) graduated cylinder with the scale beginning at 0.3 milliliters (0.3 ml) and minimum graduations of 0.1 milliliters (0.1 ml).

5.5 Level. Level to verify attitude of nozzle.

5.6 Funnel. Gasoline resistant, non-breakable funnel of appropriate size for use with the graduated cylinder. If a bellows-equipped nozzle is tested, use a funnel wide enough to capture all drips from the nozzle boot.

5.7 Gasoline container. Gasoline container in which to empty the cylinder.

5.8 Tape, scribe or marking device. Use to mark nozzle attitude.

5.9 Other Equipment. Gasoline resistant gloves. Use to protect skin.

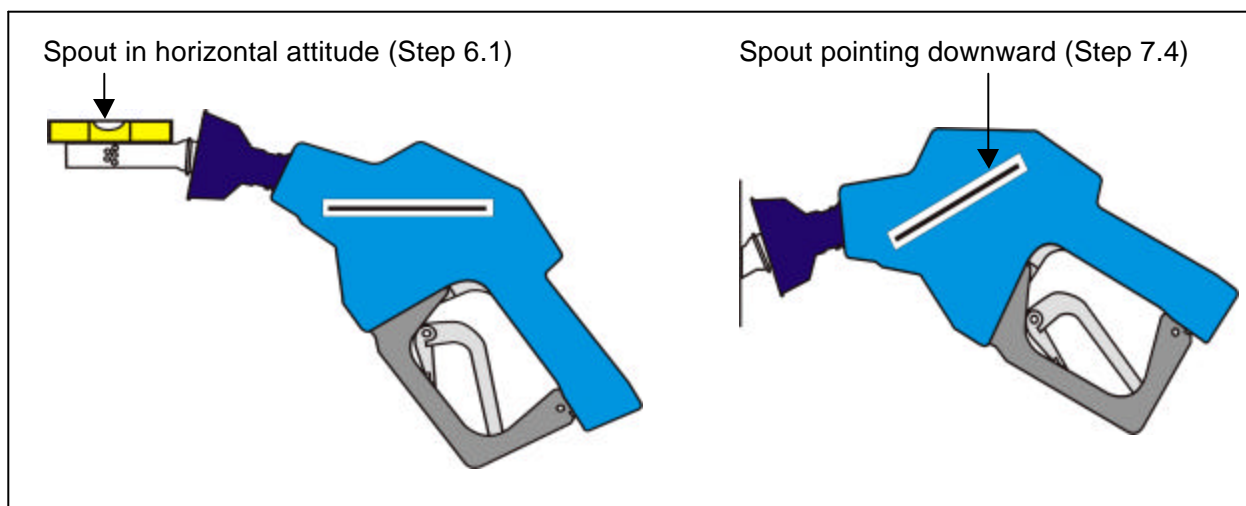
6. PRE-TEST PROCEDURES

6.1 Obtain the attitude of spout tip by placing the nozzle against the dispenser to hold nozzle steady. Using the level, position the spout tip horizontal (parallel) to the ground. With tape or a scribe, mark a visual indicator of this attitude on both sides of nozzle (See Figure 1). ~~Inspect the vapor recovery nozzles and associated hanging hardware and verify that all components are in good working order, as specified in title 17, CCR, section 94006, including the requirement that the nozzle's shutoff mechanism is in good working order.~~

6.2 Enter nozzle information on Nozzle Data Sheet (See Form 2).

[ADD FIGURE 1 BELOW]

Figure 1
Nozzle Attitude



7. TEST PROCEDURE

~~7.1 Assign, and record on the Field Data Sheet, a Survey ID # to each vehicle included in the test.~~

~~7.2~~

7.1 The tester shall select a vehicle for the test by choosing the next vehicle that appears, for which the refueling event is about to begin.

~~7.2.1~~

7.1.1 The tester should introduce ~~themselves~~ themselves to the customer and ask if the refueling event is to be a fillup. If the answer is no, the tester shall select the next potential test vehicle.

~~7.2.2~~

7.1.2 If the customer acknowledges that they want a fillup, the tester should ask to refuel the vehicle, explaining the purpose and details of the test.

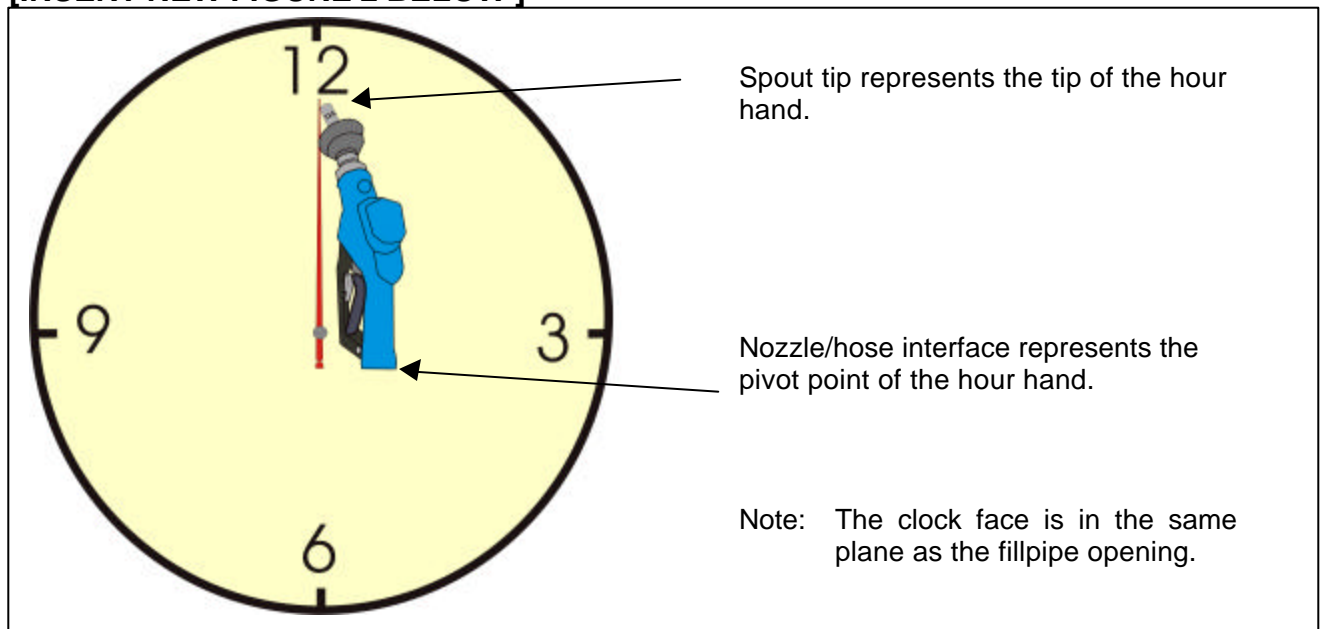
7.2 Verify that the ten milliliter (10 ml) graduated cylinder is empty. Position the funnel into the graduated cylinder.

7.3 Remove nozzle from the dispenser holster and Properly, properly insert the nozzle spout into the vehicle fillpipe, with Position the nozzle handle pointed downward in the 12:00 o'clock orientation for side fill vehicles and as close to a 12:00 o'clock orientation as technically feasible for rear fill vehicles. See Figure 42 for nozzle orientations.

7.4 Position the tip of the spout downward into the fillpipe. Using the visual indicator on the nozzle, verify that the attitude of the nozzle tip is pointing downward, shown by the back of the visual indicator being in an elevated position (see Figure 1). If there is any uncertainty, place the level along the visual indicator and verify that the bubble is away from the vehicle.

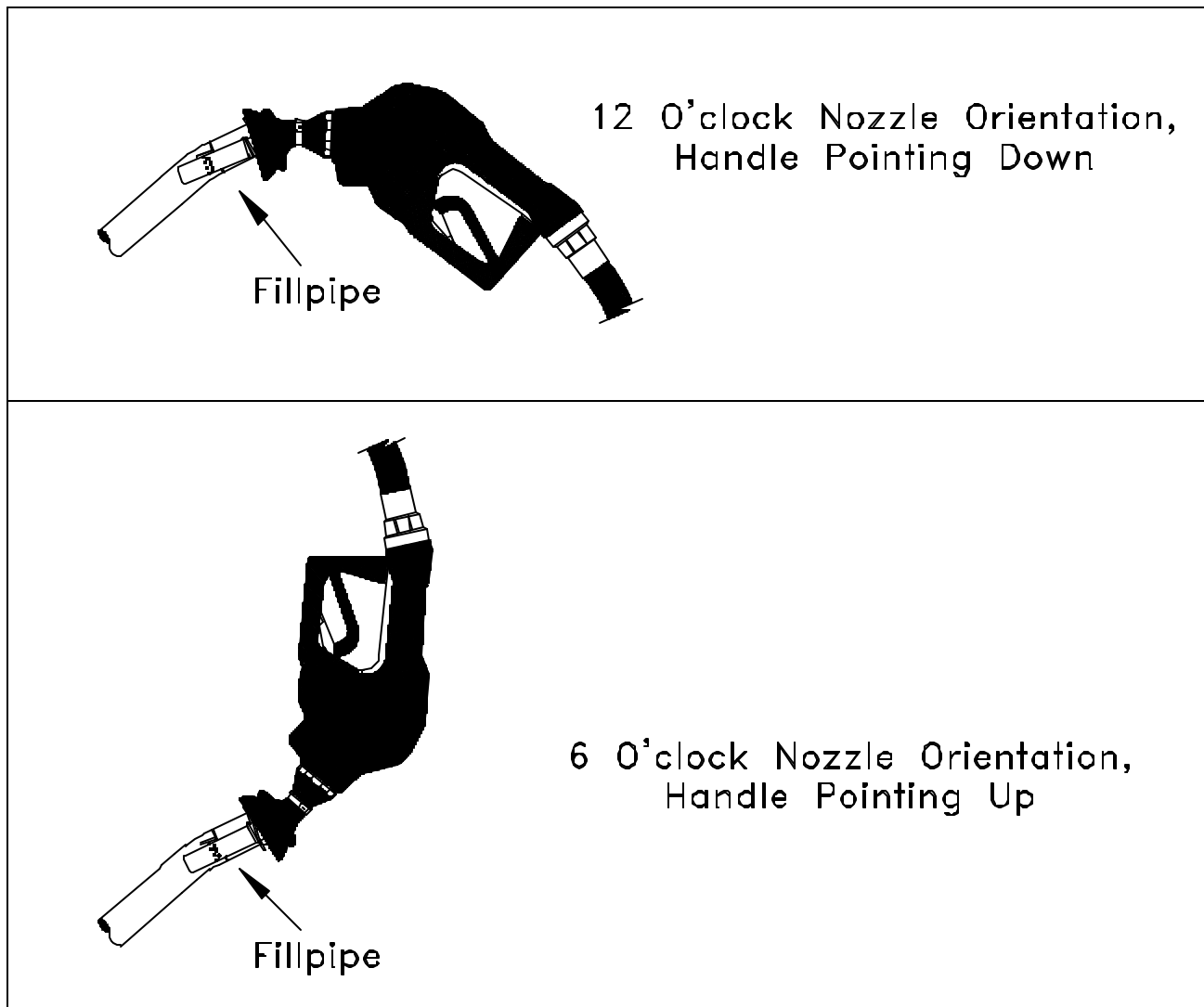
Figure 2
Nozzle Orientation at the 12 o'clock position

[INSERT NEW FIGURE 2 BELOW]



[DELETE FIGURE 1 BELOW]

~~Figure 1~~
Nozzle Orientations



~~7.4~~

~~7.5~~ Begin dispensing with the nozzle trigger in the hand-held, wide open position to achieve the maximum dispensing rate. Set the nozzle on high clip. Start the stopwatch timing when dispensing begins.

~~7.5~~

~~7.6~~ Upon activation of the nozzle's primary shutoff mechanism, stop the timing for dispensing rate determination and verify that at least 4.5 gallons were dispensed. ~~start the stopwatch used to determine the 10 second specification in Section 7.6. Record the gallons dispensed, the time required for the refueling event, and note if spitback occurred.~~ wait for ten (10) seconds before removing the nozzle from the vehicle fillpipe.

~~7.6~~ Using a stopwatch, wait for ten (10) seconds before removing the nozzle from the vehicle

~~fillpipe.~~

- 7.6.1 ~~After ten seconds,~~ Carefully remove the nozzle, keeping the spout pointing downward until the spout tip exits the fillpipe. Commence counting drips as soon as the nozzle clears the fillpipe. ~~Immediately~~ Tilt the nozzle spout tip such that the spout is ~~vertical~~, pointing straight upward.
- 7.6.2 ~~Pointing the nozzle away from the vehicle and customer,~~ Moving the nozzle away from the vehicle, promptly tilt the nozzle ~~downward~~ until the spout tip is ~~vertical~~, pointing straight downward over the funnel, and hold for five (5) seconds. Holding the nozzle as still as possible, continue counting the number of drips ~~drops of liquid~~ gasoline that spill from the nozzle. At the end of five (5) seconds, remove the measuring equipment from beneath the spout. ~~for five seconds, starting with the initial downward tilting through having the nozzle in an inverted position. Record this quantity on the Field Data Sheet along with the number of gallons dispensed and the refueling time, in seconds. For the purpose of this measurement, a drip shall consist of a maximum volume of 1/15 of a milliliter. After each measurement, empty the graduated cylinder.~~
- 7.6.3 Gasoline that exits the nozzle as a trickle will be counted as 2.5 drips and will be added to any drip(s) observed for the sum of that run. In addition, quantities of gasoline measuring 0.3 milliliters (0.3 ml) or greater will be noted on the Field Data Sheet in milliliters. If the gasoline collected measures less than 0.3 milliliters (0.3 ml), an "X" will be used for recording a value for milliliters.
- 7.7 ~~Conduct ten test runs, pursuant to Sections 7.1 through 7.6, on each of the applicable nozzles installed at the test site. Conduct at least ten test runs on each of a minimum of ten nozzles, following the procedures specified in Sections 7.1 through 7.6.3. Record data for each run on the Field Data Sheet. When measuring gasoline in the graduated cylinder, record in milliliters on Field Data Sheet; do not convert to drips.~~

~~8.~~ **POST-TEST PROCEDURES**

- ~~8.1 Calculate the average of the number of drips of liquid gasoline from each of the refueling events included in the test. Record this average to the nearest tenth of a drip on the Field Data Sheet.~~

~~9.~~

8. CALCULATING RESULTS

~~9.1~~

- 8.1** Calculate the dispensing rate for each refueling event as follows:

$$Q_d = \left(\frac{(G_d)(60)}{t_d} \right)$$

Equation 9-1

[ABOVE EQUATION 9-1 TO BE DELETED]

$$Q = \frac{(G)(60)}{t} \quad \text{Equation 8-1}$$

[ABOVE IS NEW EQUATION 8-1 TO BE INSERTED]

Where:

- Q_d = Dispensing rate, gallons/minute
- G_d = ~~Quantity of Gasoline~~ Gasoline dispensed during the refueling event, gallons
- t_d = ~~Time to dispense G_d gallons~~ Duration of fueling event, seconds
- 60 = Conversion factor from seconds to minutes

~~9.2~~

~~8.2~~ Convert run results expressed in milliliters to drips. For conversion purposes, one milliliter (1 ml) equals 20 drips. Runs that have recorded values for drips and for milliliters shall be calculated using the value that represents the higher amount of drips. Calculate the average result of all test runs from all the nozzles as follows: ~~the arithmetic average for both each nozzle and all nozzles of the number of drips for each refueling event as follows:~~

$$N_{\text{drips}} = \sum_{i=1}^n \left(\frac{D_i}{n} \right) \quad \text{Equation 9-2}$$

[ABOVE EQUATION 9-2 TO BE DELETED]

$$\bar{D} = \frac{d}{n} \quad \text{Equation 8-2}$$

[ABOVE IS NEW EQUATION 8-2 TO BE INSERTED]

Where:

- $N_{\text{drips}} \bar{D}$ = Average number of drips for all refueling events, ~~drops drips/refueling event~~
- $D = d$ = Total of all ~~drops drips~~ from all refueling events, ~~drops drips~~
- n = Number of refueling events during test

~~10.~~

9. REPORTING RESULTS

~~10.1~~

9.1 Report the following information for post-fueling drips: ~~The results of the quantification of the number of drips per refueling event shall include:~~

~~10.1.1~~

9.1.1 All data shown in the Field Data Sheet and Nozzle Data Sheet.

~~10.1.2~~ ~~The average number of drips for all nozzles tested, expressed to the nearest tenth of a drop.~~

~~10.1.3~~

9.1.2 The combined average result of all test runs for number of drips for all the nozzles tested, expressed to the nearest tenth of a ~~drop~~ drip.

~~44~~

10. ALTERNATE PROCEDURES

~~44.4~~ This procedure shall be conducted as specified. Modifications to this test procedure shall not be used to determine compliance unless prior written approval has been obtained from the CARB Executive Officer, pursuant to Section 14 of Certification Procedure CP-201.

[DELETE THIS FORM 1]

Form 1
Field Data Sheet
POST – FUELING DRIPS

| | | |
|-----------|------------|--------------------------|
| Facility: | Test Date: | Tester(s): |
| Address: | | Phase II Equipment Type: |

| | | | | | | | | | | |
|-------------------------------------|--|--|--|--|--|--|--|--|--|--|
| Survey ID # | | | | | | | | | | |
| Vehicle Information | | | | | | | | | | |
| Year | | | | | | | | | | |
| Make | | | | | | | | | | |
| Model | | | | | | | | | | |
| | | | | | | | | | | |
| Refueling Information | | | | | | | | | | |
| Nozzle Number | | | | | | | | | | |
| Gasoline Grade | | | | | | | | | | |
| Time Start | | | | | | | | | | |
| Nozzle Position [1 - 12 O'clock] | | | | | | | | | | |
| Gallons Pumped | | | | | | | | | | |
| Fueling Time, seconds | | | | | | | | | | |
| Dispensing Rate, gpm | | | | | | | | | | |
| Spitback, Yes or No | | | | | | | | | | |
| NOZZLE DRIP DATA | | | | | | | | | | |
| # of Post-Fueling Drops | | | | | | | | | | |
| TOTAL DRIPS | | | | | | | | | | |
| Comments | | | | | | | | | | |

| Nozzle Number | Number of Test Runs | Total Number of Post-Fueling Drips | Average Number of Post-Fueling Drips |
|---------------|---------------------|------------------------------------|--------------------------------------|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |
| 7 | | | |
| 8 | | | |
| 9 | | | |
| 10 | | | |
| 11 | | | |
| 12 | | | |
| TOTALS | | | |

[INSERT THIS FORM 1]

Form 1
TP 201.2D Field Data Sheet
POST – FUELING DRIPS

Page _____ of _____

| | | | | | | | | | | |
|--|-------|-------|-------|------------|-------|-----------------------|------------|-------|-------|-------|
| Facility: | | | | Test Date: | | | Tester(s): | | | |
| Address: | | | | | | Phase II System Type: | | | | |
| Vehicle Info | | | | | | | | | | |
| Year | | | | | | | | | | |
| Make | | | | | | | | | | |
| Model | | | | | | | | | | |
| Fueling Info | | | | | | | | | | |
| Time of day | | | | | | | | | | |
| Dispenser number | | | | | | | | | | |
| Gasoline grade (e.g.: 87, 89, 91) | | | | | | | | | | |
| Nozzle orientation (clock position) | | | | | | | | | | |
| Nozzle tip downward? (Y or N) | | | | | | | | | | |
| Duration of fueling | | | | | | | | | | |
| Automatic shutoff? (Y or N) | | | | | | | | | | |
| Fuel pumped (gallons) | | | | | | | | | | |
| Spitback? (Y or N) | | | | | | | | | | |
| Drip Data | | | | | | | | | | |
| Drips measured | drips | drips | drips | drips | drips | drips | drips | drips | drips | drips |
| Milliliters measured | ml | ml | ml | ml | ml | ml | ml | ml | ml | ml |

Comments: _____

[INSERT THIS FORM 2]

Form 2
TP 201.2D Nozzle Data Sheet
POST – FUELING DRIPS

| | | |
|-----------|------------|-----------------------|
| Facility: | Test Date: | Tester(s): |
| Address: | | Phase II System Type: |

| | | | | | | |
|--------------------------------------|--|--|--|--|--|--|
| Dispenser number | | | | | | |
| Gasoline grade (e.g.: 87, 89, 91) | | | | | | |
| Manufacturer | | | | | | |
| Model number | | | | | | |
| Serial number | | | | | | |
| Date code | | | | | | |

| | | | | | | |
|--------------------------------------|--|--|--|--|--|--|
| Dispenser number | | | | | | |
| Gasoline grade (e.g.: 87, 89, 91) | | | | | | |
| Manufacturer | | | | | | |
| Model number | | | | | | |
| Serial number | | | | | | |
| Date code | | | | | | |

| | | | | | | |
|--------------------------------------|--|--|--|--|--|--|
| Dispenser number | | | | | | |
| Gasoline grade (e.g.: 87, 89, 91) | | | | | | |
| Manufacturer | | | | | | |
| Model number | | | | | | |
| Serial number | | | | | | |
| Date code | | | | | | |

